Discussion:
"Financial Development and
the Diffusion of Technologies"
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Summary of the Paper

Clear question, clear writing, polished empirics, and policy relevant

Question: To what extent does financial development increase technology diffusion of more capital-intensive technologies (compared to less capital-intensive ones)?

Mechanism: At an early adoption stage, many small firms try to figure out the use of a technology. A lot of experimentation which requires external capital provides by financial markets

Klepper (2007) on motor car industry. 1909: widespread experimentation (270 automobile startups). 1940: industry dominated by 9 firms

Contribution: First paper looking at the effect of FD on tech diffusion (for sure in a historical context)

Result: FD causally impacts the diffusion of techs, especially high K-int and only in initial adoption stages

Review of Robustness Tests (1)

- **Reverse Causality:**

  Tech adoption $\rightarrow \uparrow$ Y $\rightarrow \uparrow$ FD

  - controls: GDPpc; GDPpc * K-intensity

  K-intensive tech adoption $\rightarrow \uparrow$ I (for given Y) $\rightarrow \uparrow$ FD

  - investment in adoption of new techs $!=$ K-intensity

  $\rightarrow$ Additionally for both: only significant for early adopters

- **Omitted Variables (time-invariant):**

  Genetic diversity, Culture, Geography

  - controls: country FE

  Geographical vars that could differentially impact K-intensive techs: country size, ruggedness of the terrain, property rights

  - controls: country FE * D(K-intensity)

Review of Robustness Tests (2)

- **Omitted Variables (time-varying):**

  Controls: GDPpc * K-intensity

  Coefs only +ive for early adopters

  Similar coefs for full sample and for Europe & North America

  Additional vars interacted with K-intensity: (i) PolityII; (ii) HK (secondary enrollment); (iii) G/GDP (1960s onwards)

- **Tech Classification:**

  Tradables: all low K-intensity techs tradable; but only some high K-intensity techs tradable
  - Traders need credit to import/export
  - Credit provided by financial institutions
  - FD helps for the diffusion of tradables (i.e. low K-intensity)
  - But coefficient estimates tell the opposite story!

Exploit Variation in Diffusion over Time

▶ **Variation across the 16 technologies:** Median diffusion lags vary a lot: 5-170 years for low K-intensive; 13-96 years for high K-intensive. Is it less problematic to have low FD if the natural speed of diffusion is slow?

▶ **Descriptive variation within country-tech over time:** Is the speed of diffusion constant or rather jumpy over time?

▶ **Extensive vs Intensive Margin:** Countries with high FD, do they start to diffuse technologies earlier? Or, conditional on having started to diffuse, does it happen faster?

▶ **Financial Market Saturation:** Variation in the timing in which K-intensive technologies arrived: (i) 1825 & 1835; (ii) 1875 & 1882; (iii) 1907; (iv) 1950; (v) 1973. If two K-intensive technologies are discovered at the same "time", does it slow down the speed of diffusion, e.g. due to limited supply of K and/or entrepreneurs?

General Equilibrium Story

- ▶ 2 sectors: h (high K-intensity) and l (low K-intensity)

- ▶ 2 countries: H (high FD) and L (low FD)

- ▶ Timing:
  In $t=1$, only sector "l" exists. Both H and L fully specialised.
  In $t=2$, sector "h" is discovered.

- ▶ How does production change?

  Country "L": nothing changes. Their financial sector cannot provide enough K to entrepreneurs

  Country "H": both K and labour partly reallocate to sector "h", so that now H produces both "h" and "l".

- ▶ Do we observe a reduction in the speed of diffusion of sector "l" in country "H" (compared to sector "l" in country "L")?

The Role of Geography

Assumptions:

- ▶ low K-int ideas can be developed by all countries while high K-int ideas initially only by the subset of high FD countries
- ▶ able to identify country-year where each idea originates
- ▶ geographical distance matters for knowledge diffusion

- ▶ Do **low** K-intensive ideas have a more natural geographical spreading of ideas over time? (no geographical bumps in the middle since all countries adopt the idea)

- ▶ New **high** K-intensive idea discovered. Must high FD country delay its adoption and diffusion due to neighboring countries (closer to where idea originated) being low FD, and therefore not able to adopt the idea in the initial stages?

- ▶ Once the first low FD country adopts a K-intensive technology, does it become easier to the rest? (e.g. alternative method found for its adoption)

Natural Sequential Order of Idea Arrival

- ▶ Suppose that new ideas do not arrive in a random way. Rather, there is a natural sequential order to the arrival of new ideas.

- ▶ If a country with low FD cannot develop the idea discovered in "t-1" (K-intensive), could it also affect the speed at which it adopts the idea discovered in "t" (not K-intensive)?

Additional Comments

- ▶ Table 3, columns (3) and (4): the result is driven by the top 25% of high FD countries. The interaction term as it is now is linear, but the true function seems to be non-linear. Therefore, try two things: (i) quadratic and cubic terms; (ii) split "Deposits/GDP X capital intensity" into 3 dummies (high, medium, low)

- ▶ Do high K-intensive ideas arise in high FD countries, while low K-intensive ideas in low FD countries? If this is the case, the original ideas of low FD countries can be developed by everyone, thereby potentially increasing welfare to a greater degree?